

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Currently amended) A tunable diffraction grating comprising:
a cell with a first cell wall spaced from a second cell wall;
electrodes disposed on facing surfaces of the first and second cell walls;
and
an array of nematic liquid crystal convective rolls, wherein said convective rolls are arranged periodically in a space between said first cell wall and said second cell wall; and
a polymeric network stabilizing said array of nematic liquid crystal convective rolls.
2. (Currently amended) The tunable diffraction grating of claim 1, wherein the convective rolls are arranged with a grating constant spacing approximately twice the separation distance between said first and second cell walls.
3. (Original) The tunable diffraction grating of claim 1, further comprising:
a power source connected to said electrodes to apply an electric field, wherein said convective rolls are arranged with a structure factor, and said structure factor is adjusted by application of an electric field through said power source.
4. (Currently amended) A method for producing a diffraction grating comprising the steps of:
introducing a polymerizable mixture including nematic liquid crystal, dopant, and polymerizable precursor between two electrically conductive substrates;
applying a potential difference across the polymerizable mixture to cause the nematic liquid crystal to assemble into an array of convective rolls; and
stabilizing the convective roll structure by forming a polymer network from the polymerizable precursor, wherein the polymer network is templated bounded by the

convective roll structure.

5. (Original) The method according to claim 4, wherein the polymerizable mixture further includes an initiator, said initiator being activated in said step of stabilizing to initiate the formation of the polymer network from the polymerizable precursor.

6. (Original) The method according to claim 5, wherein the initiator is a photoinitiator and said step of stabilizing includes photoinitiation of the photoinitiator.

7. (Original) The method according to claim 4, wherein said convective rolls are arranged with a structure factor after said step of stabilizing, and the method further comprises, after said step of stabilizing:

adjusting the structure factor by application of an electric field through at least one of the electrically conductive substrates.